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PROSPECTS OF USING GROWTH SUBSTANCES IN PLANT CULTIVATION

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It is customary to consider growth substances, or growth hormones (Phylo-hormones), as regulators of plant growth. As is well known, growth substances which form in plants are necessary growth factors and regulators of food distribution. Thus, if the lamina of the leaf, that is, that part of the leaf in which occurs not only the formation of sugars and albumins but also growth substances, is cut off, the petiole withers away. If, however, a paste containing the growth substance is applied on the end of the petiole where the lamina was, the petiole will survive.

A similar situation is observed among fruit-bearing plants. The growth substances produced in the fruit seed which flow down the fruit stem delay the formation of the detaching layer, thereby aiding the fruit in holding on to the plant. With the maturing of the fruit, the formation of growth substances is sharply decreased. This leads to the rapid formation of the detaching layer and hastens the fall of the fruit.

The lack of growth substances can be compensated for by introducing synthetic growth substances into the fruit. Experiments have shown that the removal of seeds from the cotton boll and the application of a paste containing growth substances in their place will keep the boll from falling off. Quite a different phenomenon is observed if the growth paste is not put into the empty boll. The boll in this case falls in a few days. Why does the application of growth substances have such a positive effect? Studies on this question proved that the introduction of growth substances increases the flow of food substances, and this increase delays the formation of the separating layer.

Findings made by the expedition of the Institute of Plant Physiology imeni K. A. Timiryazev of the Academy of Sciences and the Institute of Botany of the Tadzhik Affiliate of the Academy

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of Sciences USSR have shown that it is actually possible to retard both the fall of the leaves and the fruit by the application of these growth substances. Practical application of this characteristic of the growth substances was decided upon to prevent the fall of cotton bolls.

Experiments produced positive results and proved that cotton shrubs sprayed at an appropriate time with a solution of growth substances had a smaller percentage of fallen bolls. This fact is of practical value and indicates the necessity in organizing appropriate work on the largest possible scale.

Experiments with tomatoes have likewise produced positive results. Application of growth substances on flowering racemes improved the relation between the fruit and the plant and promoted the growth and ripening of the fruit. The yield from treated plants also proved to be larger.

Both the data acquired by the expedition and the results of other investigations show that an increase of two to three times in the tomato crop depends not only on the decrease in the fall of the flowers but also on the basis that the fruit was considerably larger in size than the control fruit. Thus, for example, if the average weight of the fruit from the control plant of the Tuskvud /Tuckswood? variety is 65.6 grams then the fruit from the treated plant weighed 164.3 grams. The quality is likewise improved along with this considerable increase in weight.

If the growth substance falls on flowers which have not been fertilized, seedless fruit is formed. The seedless fruit far surpasses the seeded fruit in quality. The ease with which tomatoes may be treated with growth substances, the high degree of effectiveness of this method, and the possibilities of producing seedless fruit by this means accentuate the desirability of introducing this work in 1948 on the widest possible scale.

The application of these growth substances to tomatoes has become the objective of not only the scientific and experimental institutions but also of the kolkhozes, sovkhoses, and individual truck farmers in many USSR republics.

The application of growth substances to prevent the fall of tomatoes proved similarly promising on other fruits as well. Thus, according to the findings of Professors Yu. V. Rakitin and S. V. Krylov, the spraying of growth substances reduced the falling of apples one-fourth to one-sixth.

That seedless fruit can be obtained with the aid of growth substances can be based on the fact that while the growth substances, necessary for the growth of the fruit, are supplied by the seeds and without which the fruit itself will not grow, it is also known that certain types of grapes, cucumbers, and a number of other plants have no seeds at all and yet in these cases the growth substances are available in sufficient quantity in the unfertilized germ. When the growth substances are introduced into unfertilized flowers, the growth of the fruit is stimulated even though no seeds are present. Experiments on the application of growth substances in aiding stalks to take root have also produced some interesting results. The stalks of the Tadzhik Gandelion, discovered by Prof P.N. Ovchinnikov, take root more energetically than the control plants when the growth substances are applied in an optimum concentration. Application of

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greater doses of growth substances on the dandelion brought about a delay in the formation of leaves and a greater abundance of roots. These results prove once more that leaves are much more sensitive than roots to supplementary applications of the growth substances. It is precisely this that explains the fact that the application of identical quantity of growth substances inhibits the development of the leaves and stimulates the formation of roots. These present experiments refute once again the claims of certain foreign scientists that there are specific substances, the hormones, which affect only the formation of stems, roots, or flowers.

The study of growth substances is a new division of plant physiology, but in spite of this it has proven its worth in playing an outstanding role in the discoveries of plant secrets. Growth processes in any desirable botanical field are made possible with the aid of these growth substances.

There exists in Tadzhik SSR a great field for the additional use of growth substances on a large scale, but their application must proceed with the following objectives:

1. Control of the fall of cotton buds and bolls as well as the fall of flowers and fruits of apricot, peach, apple, pomegranate and other trees.
2. Use of growth substances for increasing the roots of dandelions, the best types of local and Japanese mulberry trees, the plane tree, poplar, and sugar cane. Growth substances are being widely used by the Pakhtaabad ester-bearing plant station in aiding the geranium to take root and increase the yield of this valuable crop.
3. Devising of methods for destroying weeds.
4. Use of growth substances to delay the flowering buds of almond, peach, apricot, and other trees and preserve the blossoms against spring frosts. These substances can also be used to inhibit the sprouting of potatoes and preserve the qualitative and planting characteristics.
5. Increasing the yield and obtaining seedless fruit from tomatoes and other plants.

At the All-Union Conference on growth substances recently held in Moscow, speakers from Republic scientific institutions pointed out that the use of growth substances is not limited to the above-mentioned data, but could be successfully applied in many other fields of agriculture. When combined with high agrarian technology, these substances have a particularly great effect.

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